USEFUL INFORMATION ON LEATHER BELTING

- Selection
- Installation
- Maintenance

SOME ADVANTAGES OF MODERN LEATHER BELTING

FULL-FRICTION PULLEY GRIP

Has a higher coefficient of friction than most other belting materials. This provides positive, non-slip grip.

SHOCK ABSORBING CAPACITY

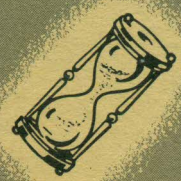
A self-adjusting, elastic quality plus great strength.

OPERATING STAMINA

Resiliency and wear-resistance enable it to continue to transmit power efficiently for many years of severe, continuous service.

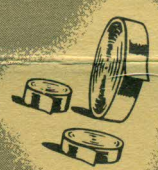
LONG LIFE

Leather all the way through, it can't separate or disintegrate. Its durability has been proven.



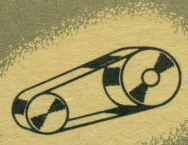
MINIMUM INVENTORY

A few widths in your stock room will take care of a wide range of needs.



ADAPTABILITY

Can be fitted to the required centers right on the drive, without dismantling the machine. Easy to lengthen or shorten. Ready to use, in most cases, with existing pulleys. No special pulleys or sheaves required.



American LEATHER BELTING *Association*

Headquarters for Authentic Power Transmission Data

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American Leather Belting Association

HORSEPOWER RATINGS FOR OAK TANNED FLAT LEATHER BELTING

EXPLANATION OF TABLES AND DIRECTIONS FOR USE

FOR ELECTRIC MOTOR DRIVES

TABLE I—Read from it the belt speed in F.P.M. corresponding to pulley diameter at its specified speed in R.P.M.

TABLE II—Value of "K"—the theoretical horsepower capacity of belt per inch of width for different thicknesses at the speeds indicated. Minimum recommended pulley diameters shown at bottom of table.

TABLE III—Motor load factor "M" dependent upon starting characteristics of electric motor used.

TABLE IV—Pulley correction factor "P" for diameter of smaller pulley.

To find width or horsepower rating of belt use formulas:

$$W = \frac{R \times M}{K \times P} \quad \text{or} \quad H = \frac{W \times K \times P}{M}$$

Where
W = width of belt in inches
R = name plate horsepower rating of the electric motor
H = horsepower rating of belt
M = motor load factor — Table III
K = theoretical belt capacity factor — Table II
P = pulley correction factor — Table IV

For special operating conditions multiply belt width obtained above by a factor "F" selected from Table V.

FOR DRIVES OTHER THAN FROM ELECTRIC MOTORS

To find belt width or horsepower rating of belt use formulas:

$$W = \frac{H \times F}{K \times P} \quad \text{or} \quad H = \frac{W \times K \times P}{F}$$

Where
H = horsepower rating of belt
F = special factor — Table V
K = theoretical belt capacity factor — Table II
P = pulley correction factor — Table IV

TABLE I — Belt Speeds in F.P.M. For Different Pulley Diameters and R.P.M.

Pulley Diam. Inches	FULL LOAD MOTOR SPEED							
	3450 RPM	1750 RPM	1150 RPM	850 RPM	690 RPM	575 RPM	490 RPM	435 RPM
2	1805	916	602		BELT SPEED F. P. M.			
2½	2257	1145	753					
3	2708	1374	903	667				
3½	3160	1603	1054	779	632			
4	3611	1832	1204	890	721	602		
4½	4062	2062	1355	1001	810	677		
5	4514	2291	1505	1113	902	752	642	
5½	4965	2520	1656	1224	992	828	706	
6	5417	2749	1806	1335	1082	903	770	684
6½	5868	2978	1957	1447	1171	978	834	741
7	6319	3207	2107	1558	1261	1054	899	798
8	7222	3665	2408	1780	1441	1204	1027	912
9	8125	4124	2709	2003	1622	1355	1155	1026
10		4582	3010	2225	1800	1505	1284	1140
11		5040	3311	2448	1980	1656	1412	1254
12		5498	3612	2670	2161	1806	1541	1368
13		5956	3913	2893	2342	1957	1669	1482
14		6414	4214	3115	2522	2107	1797	1596
15		6873	4515	3338	2705	2258	1926	1710
16		7331	4816	3560	2882	2409	2054	1824
17		7789	5117	3783	3062	2559	2182	1937
18			5418	4006	3240	2710	2311	2051
19			5719	4228	3422	2860	2439	2165
20			6020	4451	3605	3011	2568	2279
21			6321	4673	3793	3161	2696	2393
22			6622	4896	3965	3312	2824	2507
23			6923	5118	4150	3462	2953	2621
24			7224	5341	4330	3613	3081	2735
25				5568	4520	3766	3210	2849
26				5790	4700	3917	3338	2963
27				6013	4881	4068	3466	3077
28					5062	4218	3595	3191
29					5243	4369	3723	3305
30					5423	4520	3851	3419

TABLE II — Horsepower Per Inch of Width — "K"

Belt Speed Feet per Min.	SINGLE PLY		DOUBLE PLY			TRIPLE PLY	
	11/64"	13/64"	18/64"	20/64"	23/64"	30/64"	34/64"
	Med.	Heavy	Light	Med.	Heavy	Med.	Heavy
600	1.1	1.2	1.5	1.8	2.2	2.5	2.8
800	1.4	1.7	2.0	2.4	2.9	3.3	3.6
1000	1.8	2.1	2.6	3.1	3.6	4.1	4.5
1200	2.1	2.5	3.1	3.7	4.3	4.9	5.4
1400	2.5	2.9	3.5	4.3	4.9	5.7	6.3
1600	2.8	3.3	4.0	4.9	5.6	6.5	7.1
1800	3.2	3.7	4.5	5.4	6.2	7.3	8.0
2000	3.5	4.1	4.9	6.0	6.9	8.1	8.9
2200	3.9	4.5	5.4	6.6	7.6	8.8	9.7
2400	4.2	4.9	5.9	7.1	8.2	9.5	10.5
2600	4.5	5.3	6.3	7.7	8.9	10.3	11.4
2800	4.9	5.6	6.8	8.2	9.5	11.0	12.1
3000	5.2	5.9	7.2	8.7	10.0	11.6	12.8
3200	5.4	6.3	7.6	9.2	10.6	12.3	13.5
3400	5.7	6.6	7.9	9.7	11.2	12.9	14.2
3600	5.9	6.9	8.3	10.1	11.7	13.4	14.8
3800	6.2	7.1	8.7	10.5	12.2	14.0	15.4
4000	6.4	7.4	9.0	10.9	12.6	14.5	16.0
4200	6.7	7.7	9.3	11.3	13.0	15.0	16.5
4400	6.9	7.9	9.6	11.7	13.4	15.4	16.9
4600	7.1	8.1	9.8	12.0	13.8	15.8	17.4
4800	7.2	8.3	10.1	12.3	14.1	16.2	17.8
5000	7.4	8.4	10.3	12.5	14.3	16.5	18.2
5200	7.5	8.6	10.5	12.8	14.6	16.8	18.5
5400	7.6	8.7	10.6	12.9	14.8	17.1	18.8
5600	7.7	8.8	10.8	13.1	15.0	17.3	19.0
5800	7.7	8.9	10.9	13.2	15.1	17.5	19.2
6000	7.8	8.9	10.9	13.2	15.2	17.6	19.3
Minimum Pulley Diameter — Belts Under 8" Wide	3"	5"	6"	8"	12"	20"	24"
Minimum Pulley Diameter — Belts 8" Wide and Over			8"	10"	14"	24"	30"
These are the minimum allowable pulleys for the above thickness belts.							

For Belt Speeds Over 6000 Feet Per Minute Consult your Leather Belting Manufacturer.

TABLE III — Correction Factors "M" For Type of Motor and Starting Method Used

Motor type and starting method	*Correction factor, M*
Squirrel cage, compensator starting	1.5
Squirrel cage, line starting	2.0
Slip ring and high starting torque	2.5

TABLE IV — Correction Factors "P" For Diameter of Smaller Pulley

Diameter of small pulley, in.	*Correction factor, P*
4 and under	0.5
4½ to 8	0.6
9 to 12	0.7
13 to 16	0.8
17 to 30	0.9
Over 30	1.0

TABLE V — Correction Factors "F" For Special Operating Conditions

Operating conditions	*Correction factor, F*
Oily, wet or dusty atmosphere	1.35
Vertical drives	1.2
Jerky loads	1.2
Shock and reversing loads	1.4

HANDY FORMULAS

1) To find belt speed in feet per minute

$$\text{Speed} = 0.262 \times D \times N \quad \text{or}$$
$$= 0.262 \times d \times n$$

2) To find length of belt in inches on open drive

$$\text{Length} = 2C + 1.57 (D + d) + \frac{(D - d)^2}{4C}$$

3) To find length of belt in inches on crossed belt drive

$$\text{Length} = 2C + 1.57 (D + d) + \frac{(D + d)^2}{4C}$$

4) To find arc of contact of belt in degrees on smaller pulley

$$\text{Arc} = 180^\circ - \left[\frac{57.3 (D - d)}{C}\right]$$

Where

D = Diameter of larger pulley in inches
d = Diameter of smaller pulley in inches
C = Distance between pulley centers in inches
N = Speed in R.P.M. of larger pulley
n = Speed in R.P.M. of smaller pulley

5) To find number of feet of belting in a roll

$$L = 0.1309 \times N \times (D + d)$$

where L = Length of belting in feet
N = Number of loops in roll
D = Outside diameter of roll in inches
d = Diameter of core or hole in inches

THICKNESS SPECIFICATIONS

Medium, Single Ply, 11/64" Average Heavy, Single Ply, 13/64" Average	"All thicknesses in this table are average thicknesses in inches, and should be determined by measuring 20 coils and dividing this total by the number of coils measured. In rolls of belting containing less than 20 coils, the average thickness should be determined by measuring all the coils in the roll. Allowable tolerances for all thicknesses plus or minus 1/64th inch from above averages."
Light, Double Ply, 18/64" Average Medium, Double Ply, 20/64" Average Heavy, Double Ply, 23/64" Average	
*Medium, Triple Ply, 30/64" Average *Heavy, Triple Ply, 34/64" Average	Uniformity: No point in single belting shall be more than 3/64" thicker or more than 2/64" thinner than the average thickness. With doubles, the tolerances shall be 2/64" thicker or thinner than the average.

*TRIPLE PLY: These are averages for general usage. Most triple ply belts are usually constructed for particular drive conditions. *Tolerances for Single and Double Ply Belts do not apply.* Consult your Leather Belting Manufacturer for specific information concerning thickness and construction of 3 Ply Belts.

BELT INSTALLATION

HOW TO INSTALL LEATHER BELTS CORRECTLY

Insure better belt performance by taking the time to check alignment, tension and other details, *before* starting up a Leather Belt drive.

METHOD OF ALIGNING SHAFTING AND PULLEYS

An easy method of aligning pulleys and shafting is shown in Figure No. 1.

Procedure:

1. Check shafts with a level.

2. Determine if shafts are parallel by placing a taut string between the shafts and checking it with a large square.

3. Check alignment of pulleys using string along their edges. If pulleys are the same width, string should touch lightly at four points: A, B, C and D. If pulleys are of different widths, distance from string to pulley at points A and B should be the same. If possible give pulley half turn and recheck. When pulleys are installed one above the other a string with plumb bob can be used to check alignment.

BELT TENSION

For best results a Leather Belt should be run with the least tension needed to transmit the load without slipping.

If a belt is too slack it will slip, causing its surface to glaze, then crack and peel. If it is too tight it may put excessive loads on bearings.

Wherever possible, flat Leather Belts should be operated with the slack side on top (see Figure No. 2). This will provide a greater arc of contact between belt and faces of the pulleys, permitting lower belt tension. On short-center or vertical drives use a pivoted motor base.

Maximum pulling power is obtained by running the grain or hair side of the belt next to the pulley faces.

INSTALLING ENDLESS BELTS

Use care in forcing an endless belt over the pulleys to avoid

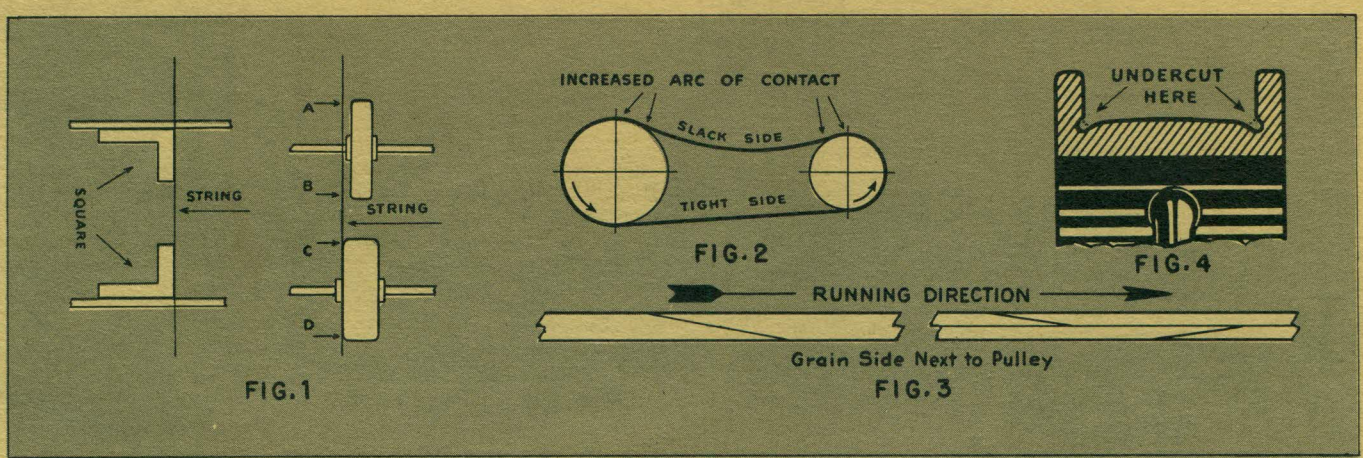

FIG. 1 FIG. 2 FIG. 4 FIG. 3

putting a crook in it. Belts, particularly those six inches and wider, should either be made endless on the job by means of clamps and rods or slipped on after temporarily shortening the center distance between pulleys. This can be done by moving motor on slide rails, loosening hanger bolts, etc.

RUNNING DIRECTION

Care should be taken to have the outside feather edge of the lap faced *away* from the direction in which the belt runs (see Figure No. 3). This tends to protect the outside points of the lap if they should strike guards, guides or shifters. It also protects the lap from being opened up by windage.

BELTS ON FLANGED PULLEYS

On flanged or step-cone pulleys, it is good practice to use belts that are at least $\frac{3}{8}$" to $\frac{1}{2}$" narrower than the pulley face.

BELT MAINTENANCE

LEATHER BELT MAINTENANCE

COMPETENT ATTENTION

Inasmuch as belts are the connecting link between power and production it pays to have a competent individual in definite charge of their installation and maintenance.

REGULAR INSPECTION

It is important to establish a system of inspection at regular intervals. The following list of questions highlights the points to be checked.

1. Is belt too dry? (See Cleaning and Dressing, item 1)
2. Is it dirty or saturated with oil? (See Cleaning and Dressing, item 2)
3. Is it too slack or too tight? (See Belt Tension, item 3)
4. Are pulleys and shafting in alignment? (See Alignment of Shafting and Pulleys, item 4)
5. What is the condition of laps, plies, lacing and ends of laced belts? (See Laps and Plies, item 5)

CLEANING AND DRESSING

1. When pulley faces begin to polish it is a sign that dressing is needed on the belt. Under normal conditions dress belts every three to six months.

Use a belt dressing approved by the belt manufacturer and designed to supply the necessary oils which were lost in use or during cleaning.

2. Keep belts as clean as possible at all times for best results. Oil or grease thrown from machine bearings will reduce belt life and pulling power. If leak cannot be stopped at source, the installation of deflectors or throwing discs will be helpful.

A small amount of oil on a belt can sometimes be removed by ordinary wiping. If this does not do the job, give it a thorough scrubbing with a solution of carbon tetrachloride and naphtha, using a stiff jute brush and working in the direction of lap joints so as not to lift them.

Another method is to remove the belt and soak it for five or six hours in a degreasing solution consisting of one part carbon tetrachloride to three parts naphtha. If carbon tetrachloride is not available, the belt can be soaked in any of the cleaning fluids used by dry cleaning establishments. Due to the fire hazard and toxic effect, the soaking and drying of the belt should be done in the open or where ventilation is good. After removing from the bath, allow belt to dry thoroughly. Always dress a belt after cleaning.

BELT TENSION

3. It is important to keep the belt tight enough at all times to transmit power without slippage. A belt that is too slack will slip and burn, causing excessive wear. If the belt is too tight, it places undue strain on the bearings.

ALIGNMENT OF SHAFTING AND PULLEYS

4. Belting cannot give good service if the pulleys or shafting are out of alignment. Indications of misalignment are (a) belt running off the pulley at one side or (b) rubbing or climbing on flanged or step-cone pulleys.

A simple test to determine whether the fault is the alignment or a crooked belt, is to turn the belt inside out or end for end. If it still runs to the same side of the pulley as before, the fault is in the alignment — not the belt.

It is important to check drive alignment at least once a year. In multiple story buildings, shifting of loads on floor above shafting may cause it to be distorted or thrown out of alignment.

Some common faults in drive alignment are:

Shafting carrying driving and driven pulleys may not be parallel.

Shafting may be sprung out of line. (Hangers should always be located near the pulleys, the points of maximum load.)

Driving and driven pulleys may be offset.

Pulley may be eccentric with shafting.

An easy method of aligning pulleys and shafting is shown on page 3.

LAPS AND PLIES

5. If cemented laps show signs of opening, re-cement them immediately.

If belt guard, shifters, guides or pulley flanges rub against edge of belt, laps and plies may open up. This condition should be corrected immediately. A good belt shifter has broad and well-rounded surfaces so as to spread thrust over a large belt edge area.

Another cause of ply and lap separation is running too thick a belt on a small pulley. (See Table II, page 2)

OTHER MAINTENANCE POINTERS

On flanged or step-cone pulleys, belts frequently have a tendency to climb. Figure No. 4 shows a simple method of correcting this condition by machining or undercutting the fillet.

Recrown fibre pulleys when they wear. When belts run off the centor of motor pulleys it may be due to a worn crown.

If blisters occur on belt and an immediate shutdown for repair is impossible, puncture the blister with a knife or awl on the trailing end. Travel of the belt over the pulley will then flatten out the blister and it can be cemented when time is available.

Litho in U.S.A.

AL-505